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Author(s)	Carlson, C. H.; Hoff, P. J.
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**TWO NEW SPECIES OF GASTROPTERIDAE FROM GUAM,
MARIANAS ISLANDS
(OPISTHOBRANCHIA: CEPHALASPIDEA)**

C. H. CARLSON and P. J. HOFF

University of Guam

With Text-figures 1-8 and Plate IX

In 1964 Tokioka and Baba established the genus *Sagaminopteron* to accomodate one species, *S. ornatum* Tokioka and Baba, 1964. According to Tokioka and Baba *Sagaminopteron* differs from the *Gastropteron* in that the former has a radular formula of 9-12.1.0.1.9-12 with the first lateral having two prominent cusps on the inner edge of the main hook, whereas the latter has a radular formula of 4-6.1.0.1.4-6 and denticulations on the inner edge of the main hook of the first lateral. On the basis of these generic characteristics and external comparative descriptions with *S. ornatum* two new species have been identified from Guam: *Sagaminopteron nigropunctatum* and *S. bilealbum*. All external descriptions are from the living animals.

We wish to thank Dr. Willard Hartman of the Peabody Museum of Natural History, Yale University, for identification of the sponges involved.

***Sagaminopteron nigropunctatum* n. sp.**

(Text-figs. 1-3, 7, 8; Pl. IX, figs. 1 & 2)

Holotype: B. P. Bishop Museum, Honolulu. Length 5.5 mm. Collected in 7.6 meters of water on reef terrace between Cocos and Merizo, Guam. Sept. 27, 1970.

Paratype: B. P. Bishop Museum, Honolulu. Length 6 mm. Collected in 3 meters of water on the reef front, Bile Bay, Merizo, Guam. Dec. 3, 1972.

DESCRIPTION: Altogether 23 specimens have been observed on Guam. Specimens vary from 3.2 to 12.7 mm in length, with the average being about 6 mm.

The general body shape is that of a member of the family Gastropteridae in that it has paired parapodia which extend up over the dorsum, an elongate tapered tail, a posterior funnel on the cephalic shield, an internal shell, and a relatively short free mantle margin on the right side. Relative sizes and shapes are difficult to describe because these change depending upon the movement of the animal.

The cephalic shield (Text-fig. 1; C.s.) is short, about one third the length of the body, broadened anteriorly with short cephalic tentacles (Text-fig. 1; C.t.) projecting

forward. The cephalic shield gradually narrows to form a posterior funnel (Text-fig. 1; F.) which is raised and projects forward almost to the anterior limit of the head when seen from a dorsal view. The dorso-median crest (Text-fig. 1; M.c.) is long; extending through the center of and projecting beyond the edge of the funnel. The funnel is relatively short and is heavy at the base. The black eye spots are near the anterior base of the funnel and are not clearly visible.

The dorsal hump (Text-fig. 1; D.h.) is broad, flattened and gradually slopes to the tail. The free mantle margin (Text-fig. 2; M.m.) originates about one third to one half of the way back on the right side of the body. It is fairly narrow at the anterior of the ctenidium (Text-fig. 2; C.) where it curves downward toward the foot and covers the anterior attachment of the ctenidium. It becomes wider posteriorly and terminates in a long flagellar appendage (Text-fig. 2; F.a.) which normally projects upward. Numerous small pustulose protuberances cover much of the dorsum, tail, and parapodia, and are most obvious at the posterior of the dorsal hump. The head has a few small protuberances. Those on the parapodia (Text-figs. 1, 2; P.) are much smaller than those on the body and tail.

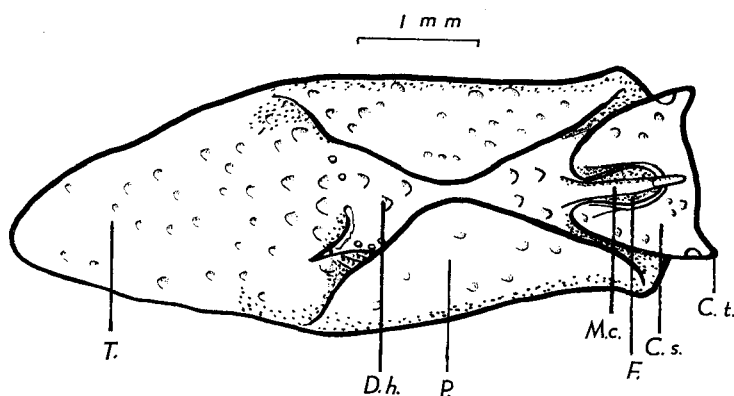


Fig. 1. *Sagaminopteron nigropunctatum* n. sp. Dorsal view. For abbreviations, see p. 150

The ctenidium is hidden by the free mantle margin and the parapodia except for the tips which are sometimes visible just below the flagellar appendage. The large ctenidium on both an 8 mm and a 5.5 mm animal has 6 dorsally projecting leaflets with all except the proximal attached to a basal rachis. The proximal leaflet is the smallest and is hidden under the free mantle margin; the leaflets immediately adjacent to the proximal leaflet are the largest. The basal rachis is submedial, runs laterally along the body and is attached except for the posterior 1/4 which also projects dorsally. The rachis of each leaflet is attached part of its length to the body, and it bears short pinnae. The anus (Text-fig. 2; A.) is just below the free mantle margin hidden by the third ctenidial leaflet. The hermaphroditic genital orifice (Text-fig. 2; H.g.o.) is just slightly behind and below the anterior edge of the ctenidium. The seminal

groove (Text-fig. 2; S.g.) is very low, indistinct and narrow leading to the male genital orifice near the mouth.

The parapodia are short extending from about halfway back on the head to approximately the posterior of the free mantle margin. The parapodia are about

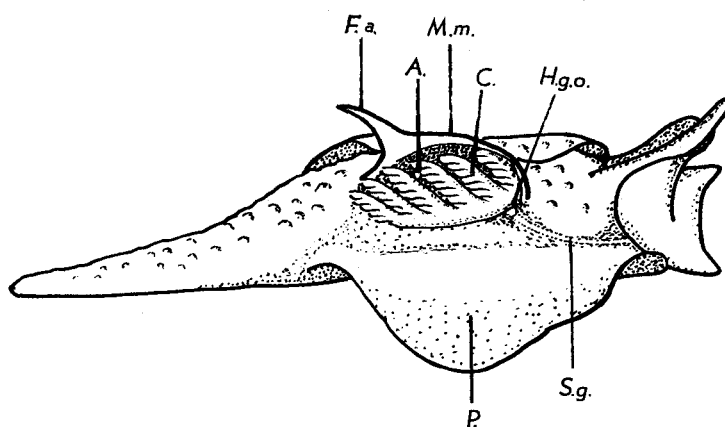


Fig. 2. *Sagaminopteron nigropunctatum* n. sp. Right side.

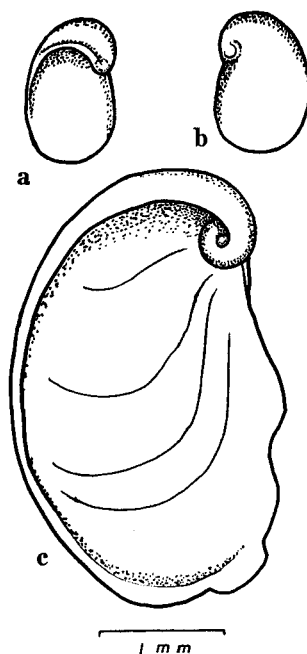


Fig. 3. *Sagaminopteron nigropunctatum* n. sp. Shells.
 a. Ventral view, shell of 3.5 mm animal.
 b. Dorsal view, shell of 3.5 mm animal.
 c. Ventral view, shell of 12.7 mm animal.

half the length of the animal. They extend up the sides to the height of the dorsum but do not normally extend across the dorsum. The animal is capable of extending the parapodia when attempting to swim.

The foot is broad, slightly over $1/3$ of the body length, and is slightly bilobed anteriorly. The foot thickens where it joins the parapodia to create a slight border between the two. There is no distinction between the foot and the tail (Text-fig. 1; T.). Although the posterior part of the dorsal hump can be seen due to the outline of the shell there is no clear demarcation between it and the tail. The dorsum gradually slants down to a very long, wide tail which is broadly rounded posteriorly. The slit (Text-fig. 7c; P.g.s.) from the pedal gland is rather short and does not extend to the end of the tail.

The shell (Text-figs. 3, 7; S.) is very large, $1/4$ to $1/3$ of the total body length, covering the area from the posterior of the free mantle margin, with the spire just below the flagellar appendage, to the anterior of the ctenidium. On smaller animals the shell is often visible from a dorsal or ventral view. On 12.7, 8.0 and 3.5 mm animals the shells were 3.6×2.2 mm, 2.2×1.4 mm, and 1.1×0.7 mm, respectively. The radular formulas for animals of 8.0, 5.5, and 3.5 mm were $32 \times 7.1.0.1.7$, $25 \times 8.1.0.1.8$, and $26 \times 8.1.0.1.8$. The radula (Text-fig. 8b) matches the characteristics delineated by Tokioka and Baba for *Sagaminopteron* in having two very prominent cusps on the inner edge of the main hook of the first lateral.

S. nigropunctatum is so well camouflaged in its natural environment that the animal is difficult to distinguish even when the observer is aware of its presence. The coloring and texture are almost identical to the grey sponge on which it is found. The basic body color is a transparent grey covered with numerous black punctate markings and light grey to cream coloured pustules. The posterior rim of the funnel is lined in orange; there is one spot of orange on either side of the head just back from the tip of the cephalic tentacles and the tip of the dorso-median crest is orange. There are usually 3 or 4 spots of orange on or near the flagellum and two or three others on the dorsum. The flagellar appendage is tipped in orange and there is a streak of orange on the dorsal side of the flagellum. The ctenidium, which is difficult to see, is transparent with black punctations.

REMARKS: *S. nigropunctatum* has been observed throughout the year, day and night. It is usually found in shallow water at depths of one to three meters. On occasion specimens occur on the reef flats and have also been collected as deep as nine meters. It has always been found on a grey sponge, *Dysidea* cf. *reticulata* (Thiele). Although this sponge has been observed at depths greater than nine meters, no *S. nigropunctatum* have been found at those depths. Even though only 23 specimens have been observed, usually if the sponge is examined, one or two animals can be found within a relatively short time. The animals are generally rather sluggish in movement in comparison to other Gastropteridae and rarely attempt to flap the parapodia to swim. They are most frequently found singly, rarely in pairs. No egg masses have been observed that can definitely be attributed to *S. nigropunctatum*.

The animal was called *nigropunctatum* because of the numerous small black punctate markings which cover the body.

Sagaminopteron bilealbum n. sp.

(Text-figs. 4-8; Pl. IX, figs. 3 & 4)

Holotype: B. P. Bishop Museum, Honolulu. Length 11.1 mm. Collected on the reef flat, Bile Bay, Merizo, Guam. April 2, 1971.

Paratype: B. P. Bishop Museum. Length 14.3 mm. Collected with holotype.

DESCRIPTION: Numerous specimens have been observed on Guam. Specimens collected vary from 4 to 15 mm in length with the average being about 11 mm.

The general shape is that of a member of the family Gastropteridae as stated in the description of *S. nigropunctatum*.

The cephalic shield (Text-fig. 4; C.s.) of *S. bilealbum* is long, being about one half of the length of the dorsal hump and is broadened anteriorly with short cephalic tentacles (Text-fig. 4; C.t.) projecting anterolaterally. The head gradually narrows to form a fairly long posterior funnel (Text-fig. 4; F.) which is raised and projects

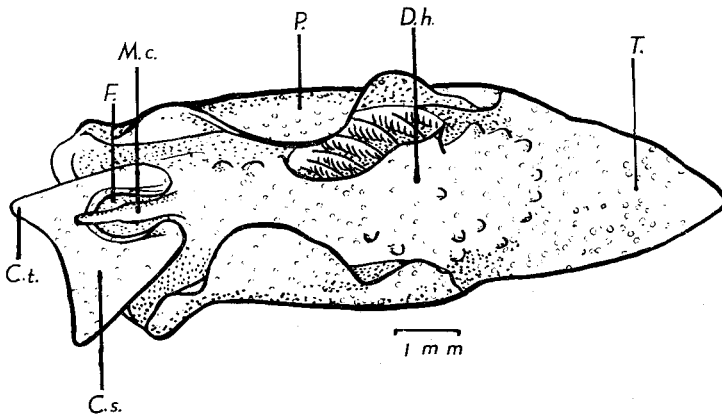


Fig. 4. *Sagaminopteron bilealbum* n. sp. Dorsal view.

forward often extending beyond the anterior of the head when seen from a dorsal view. The dorso-median crest (Text-fig. 4; M.c.) is long, extending through the center of and projecting beyond the edge of the funnel. The black eye spots are near the anterior base of the funnel and are not clearly visible except when looking down into the funnel.

The dorsal hump (Text-fig. 4; D.h.) is very broad, large, high, oval and is sparsely covered with very small pustulose protuberances. The protuberances are slightly larger at the posterior of the dorsal hump and just anterior to the free mantle margin. The dorsal hump is narrower anteriorly, broader posteriorly. The free mantle margin (Text-fig. 5; M.m.) originates about 1/4 of the way back on the right side of

the body. It is fairly narrow at the anterior of the ctenidium (Text-fig. 5; C.) where it curves downward toward the foot and covers the anterior attachment of the ctenidium. It broadens toward the posterior and terminates in a long flagellar appendage (Text-fig. 5; F.a.) which usually points either posteriorly or upward. The dorsal hump slants rather abruptly to the tail creating a distinct demarcation. The tail (Text-fig. 4; T.) is broad, long, and triangulate, terminating in a point. The slit (Text-fig. 7d; P.g.s.) from the pedal gland is very short and does not extend to the end of the tail.

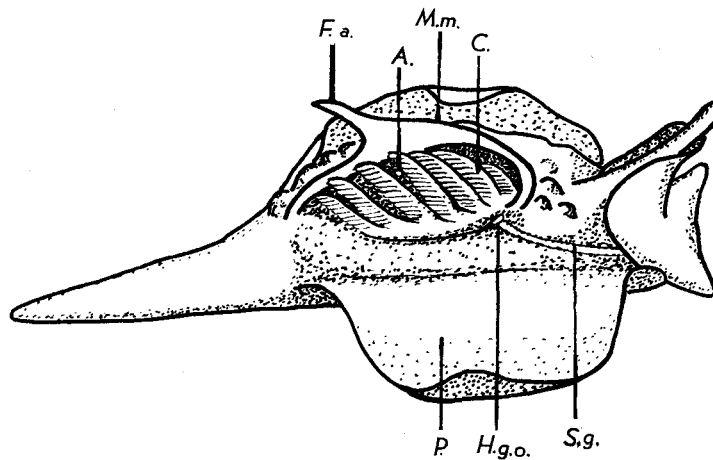


Fig. 5. *Sagaminopteron bilealbum* n. sp. Right side.

The ctenidium is large, often visible posteriorly and below the free mantle margin when the animal is crawling but at other times is hidden by the free mantle margin and parapodia (Text-figs. 4, 5; P.). The ctenidium has seven leaflets (seven were found on animals of 15, 10.5, 5, and 4 mm) with all except the proximal one attached to a basal rachis. The basal rachis is submedial, runs laterally along the body and is attached 1/2 of its length. All other leaflets are free. The proximal leaflet is hidden under the free mantle margin with the three distal leaflets projecting from the end of the basal rachis. The leaflets usually project dorsally but are capable of projecting posteriorly. The pinnae are fairly long. The anus (Text-fig. 5; A.) is just below the free mantle margin behind the fourth ctenidial leaflet. The hermaphroditic genital orifice (Text-fig. 5; H.g.o.) is just slightly behind and below the anterior edge of the ctenidium. The seminal groove (Text-fig. 5; S.g.) which appears as a narrow white line, extends from the hermaphroditic genital orifice along the lower part of the body where the body and parapodia join, and extends forward to the male genital orifice near the mouth.

When the animal is at rest the parapodia are often even with the anterior of the head. When the animal is moving they normally originate about midway on the head and extend to approximately the posterior of the dorsal hump. They are smooth,

change size and shape as the animal moves or swims; and although they do not normally meet in the center of the dorsum they are capable of doing so. The parapodia are wide making the animal almost as wide as it is long when the parapodia are relaxed. A 4 mm animal is 3.5 mm wide with parapodia relaxed. When the parapodia are extended for swimming the animal is much wider than it is long.

The foot is broad, a little over $\frac{2}{5}$ of the body length and is slightly bilobed anteriorly. The foot thickens where it joins the parapodia to create a clear distinction between the two. There is no distinction between the foot and tail.

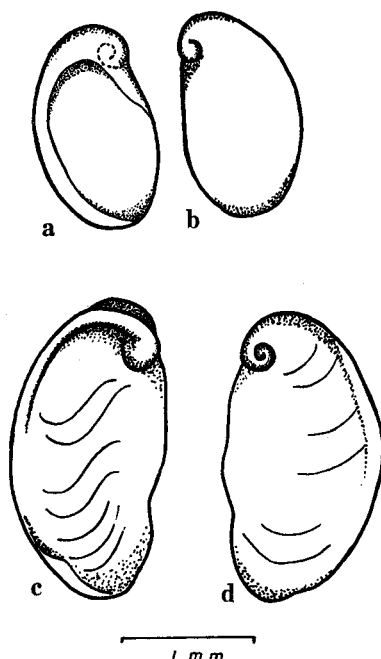


Fig. 6. *Sagaminopteron bilealbum* n. sp.

- a. Ventral view, shell of 5 mm animal.
- b. Dorsal view, shell of 5 mm animal.
- c. Ventral view, shell of 15 mm animal.
- d. Dorsal view, shell of 15 mm animal.

The shell (Text-figs. 6, 7; S.) on larger animals covers only the posterior of the dorsal hump with the spire just below the flagellar appendage. On a 15 mm animal the shell was 2.3 mm long and 1.2 mm wide. On a 10.5 mm animal the shell was 1.7 mm long and 1 mm wide. On smaller animals the shell covers more of the dorsum. Both a 4 and 5 mm animal had shells 1.5 mm long and 0.9 mm wide. The radular formulas for animals of 15, 10.5, 5, and 4 mm were $32 \times 9.1.0.1.9$, $32 \times 9-10.1.0.1.9-10$, $30 \times 9.1.0.1.9$, and $30 \times 8.1.0.1.8$, respectively. The radula (Text-fig. 8a) matches the characteristics of *Sagaminopteron* in having more numerous marginals than *Gastropteron* and in having two very prominent cusps on the inner edge of

the main hook of the first lateral.

S. bilealbum (Pl. IX, figs. 3 & 4) is white covered with small orange spots. The dorso-median crest and the tip of the flagellar appendage are orange. There are a number of very small black punctate markings running laterally in the groove below the head usually hidden by the parapodia. They do not appear on smaller animals. The ctenidium is transparent with a few orange spots.

REMARKS: *S. bilealbum* has been found in great numbers at night on the reef flat of Bile Bay, located on the southwest coast of Guam near the village of Merizo. The animal is almost always found on a chartreuse sponge, *Dysidea herbacea* (Keller). When observed during daylight hours they are seldom found in large numbers, but two or three animals are usually together. Single animals are rarely found. The animal is very active in crawling and readily flaps its parapodia to swim. The parapodia and tail become greatly extended when the animal attempts to swim. The animal is also easily irritated and emits a milky substance when disturbed. Numerous egg masses have been found with the animal during April and August and egg masses

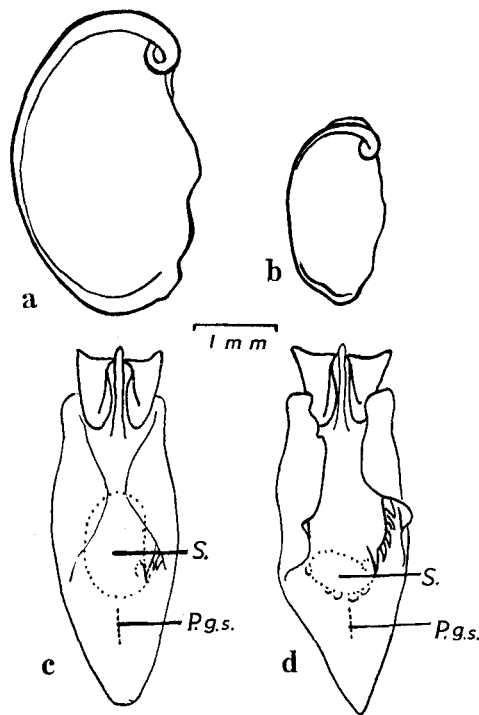


Fig. 7. a. *Sagaminopteron nigropunctatum* n. sp. Ventral view of shell of 12.7 mm animal.
 b. *Sagaminopteron bilealbum* n. sp. Ventral view of shell of 15 mm animal.
 c. *Sagaminopteron nigropunctatum* n. sp. Showing location and size of shell and location of pedal gland slit.
 d. *Sagaminopteron bilealbum* n. sp. Showing location and size of shell and location of pedal gland slit.

have been laid by animals in the aquarium. The egg mass is gelatinous with white eggs suspended singly within a transparent capsule. The egg mass is attached to the sponge or to the substrate beneath the sponge.

The animal's name represents a combination of the type locality, Bile Bay, and the basic body color.

COMMENTS: *Sagaminopteron nigropunctatum* and *S. bilealbum* can both be assigned to the genus *Sagaminopteron* on the basis of their having two prominent cusps on the inner hook of the first lateral tooth. In establishing the genus, Tokioka and Baba separated *Gastropteron* from *Sagaminopteron* also by the number of marginals: 4–6 in *Gastropteron* and 9–12 in *Sagaminopteron*. The number of marginals of *S. nigropunctatum* (7–8) and *S. bilealbum* (8–10) fall between the numbers established for the distinction between *Sagaminopteron* and *Gastropteron*. It is the opinion of the authors that the number of marginals cannot, with the knowledge currently available, be used as a distinctive characteristic between the two genera. However, a more general statement may be made that the marginals are more numerous in *Sagaminopteron* than in *Gastropteron*.

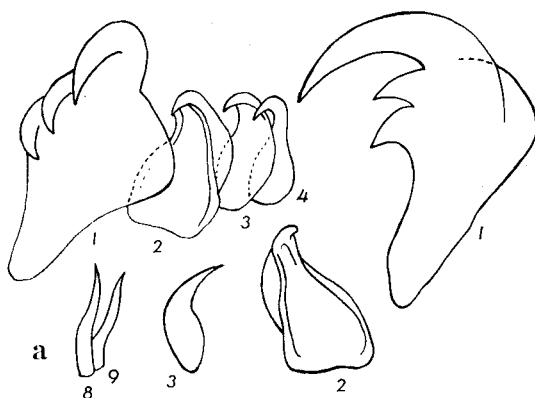


Fig. 8a. *Sagaminopteron bilealbum* n. sp. Radular teeth.

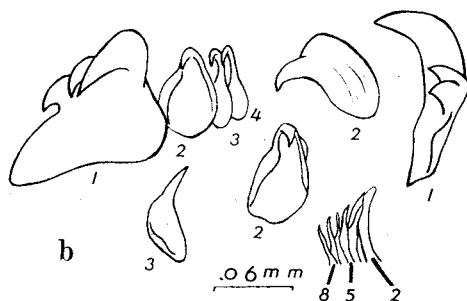


Fig. 8b. *Sagaminopteron nigropunctatum* n. sp. Radular teeth.
1. first lateral, 2. first marginal, 3... marginals.

Table 1. Comparison of the three known species of *Sagaminopteron*.

	<i>S. ornatum</i>	<i>S. nigropunctatum</i>	<i>S. bilealbum</i>
Basic color	Reddish purple	Grey	White
Protuberances	Large flagellum & smaller protuberances posteriorly	Long fairly thin flagellum & small pustules over dorsal hump, tail & parapodia	Long fairly thin flagellum & small pustules cover dorsal hump
Parapodia	Wide, often held out from sides of body	Narrow, held close to sides of body	Wide, often held out from sides of body
Free mantle margin	Very long, originates near anterior of body	More posterior, originates about 1/3 of the way back on body	More posterior, originates about 1/4 of the way back on body
Ctenidium	Free, 7 leaflets	Only ends of each leaflet free, 6 leaflets	Free except for basal rachis, 7 leaflets
Relationship of dorsal hump	Posterior of hump slants abruptly to tail creating a clear demarcation	Dorsal hump gradually slants to tail so that there is no clear demarcation	Dorsal hump slants abruptly to tail creating a clear demarcation
Dorsal hump	Ovate, rounded	Triangulate, flattened	Ovate, rounded
Tail shape	Long, broad, rounded, not defined from foot	Long, broad, rounded, not defined from foot	Long, triangulate, not defined from foot
Shell	Unknown	1/7 of body length	1/4 of body length
Radula	9-12.1.0.1.9-12, two prominent cusps on inner edge of first lateral	7-8.1.0.1.7-8, two prominent cusps on inner edge of first lateral	8-10.1.0.1.8-10, two prominent cusps on inner edge of first lateral

ABBREVIATIONS

A.	Anus	M.c.	Dorso-median crest
C.	Ctenidium	M.m.	Free mantle margin
C.s.	Cephalic shield	P.	Parapodia
C.t.	Cephalic tentacle	P.g.s.	Pedal gland slit
D.h.	Dorsal hump	S.g.	Seminal groove
F.	Funnel	S.	Shell
F.a.	Flagellar appendage	T.	Tail
H.g.o.	Hermaphroditic genital orifice		

REFERENCE

Tokioka, T. and K. Baba 1964. Four new species and a new genus of the family Gastropteridae from Japan (Gastropoda: Opisthobranchia). Publ. Seto Mar. Biol. Lab., vol. 12, no. 3, pp. 201-229, pls. 10-13, text-figs. 1-15.

EXPLANATION OF PLATE IX

Figs. 1 & 2. *Sagaminopteron nigropunctatum* n. sp.

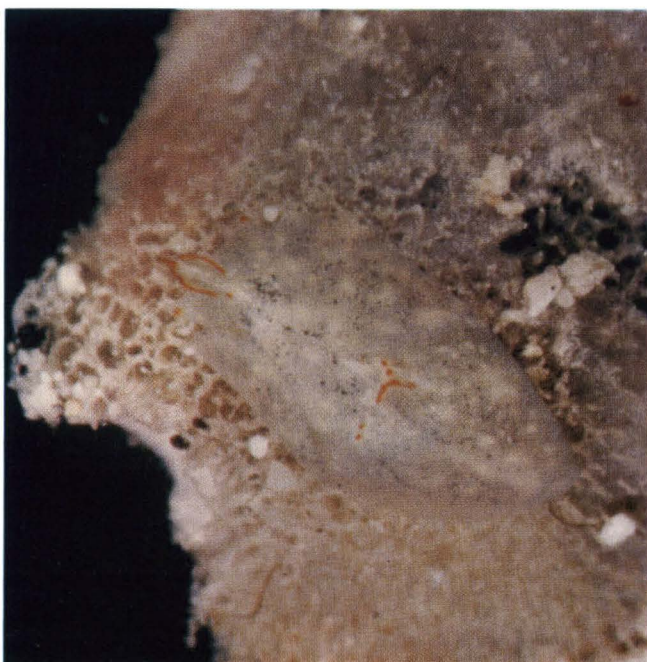
1. Dorsal view of a 5.5 mm animal.
2. Animal shown on *Dysidea* cf. *reticulata*.

Figs. 3 & 4. *Sagaminopteron bilealbum* n. sp.

3. Animal shown on *Dysidea herbacea*.
4. Dorsal view of an 11.1 mm animal.



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